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claims priority under 35 U.S.C. § 119 of French Patent Application No. 00/06869 filed on
May 22, 2000.

BACKGROUND OF THE INVENTION

1. Field of the Invention

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[0001.2] The present invention relates to an improvement to a protective helmet, and more particularly its system for connecting an accessory such as a support, for example for a night-vision device or the like, or even a protective screen.

2. Discussion of Background Information

[0002] Protective helmets are already known, which are used in various fields and worn by various users such as cyclists, motorcyclists, firefighters, skiers and others, such as aircraft or helicopter pilots. All of the currently available helmets, irrespective of their use, include a generally spherical rigid outer shell, having a facial opening, and whose cavity thus formed includes protective and comfort padding elements adapted to nest the user's head. Furthermore, the helmet is conventionally held on the user's head by a flexible chin strap fixed to the lateral portions of the helmet.

Please replace paragraphs 0005 to 0008 on pages 1 and 2 of the specification with the following (see Appendix 2 for changes):

SUMMARY OF THE INVENTION

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[0005] The present invention therefore proposes a particularly simple and reliable detachable system for connecting an accessory to the helmet.

[0006] Thus, the protective helmet of the invention including a main outer shell with a generally vertical plane of symmetry on which an accessory, such as a clear or tinted visor or a support structure for optronic equipment such as a night-vision device, can be fixed, is characterized in that it includes a connecting and locking system enabling the user to fix one or the other of the accessories to the helmet.

[0007] According to one complementary characteristic, the connecting and locking system includes mechanisms arranged on both sides of the shell and includes a hooking pin affixed to the shell of the helmet and a hooking and locking piece affixed to the accessory.

[0008] According to one embodiment, each of the pins extends outwardly on both sides of the corresponding lateral wall of the shell along a transverse axis.

Please replace paragraphs 0010 to 0012 on page 2 of the specification with the following (see Appendix 3 for changes):

[0010] Moreover, the bar includes a rearwardly open housing, whereas the lock is constituted by a hook-shaped metallic piece journaled on the bar about a pivoting axis, and whereas the lock includes a rear locking projection extending upwardly to form, together with the housing of the bar, a hole that is adapted to cooperate with the corresponding

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hooking pin of the shell.

[0011] According to one embodiment, the lock is pivotally arranged on its corresponding bar so as to be capable of pivoting downwardly against the action of the spring, and to be biased in upward abutment by this spring.

[0012] In a preferred embodiment of the invention, the support structure for a night-vision device includes a wall made of a composite material that has substantially the shape of a triangular sphere portion, whereas it includes an ocular protective screen pivotally movable about a transverse axis in relation to the shell between two positions, i.e., between an active lowered position of use according to which it is arranged in front of the user's eyes and an inactive raised position of non-use according to which it is raised so as to be in front of the frontal wall of the shell, the screen being guided in the center of the helmet by a guiding and locking carriage moving in a central slide. According to this embodiment, the wall of the support structure is arranged at the level of the front upper wall portion of the shell, beyond and at a certain distance from the latter so as to leave a space enabling the protective screen to move with its guiding carriage, whereas the wall of the support structure includes at least one hole enabling the user to have access to the guiding carriage of the ocular protective screen in order to be able to maneuver it, even in the presence of the night-vision device.

[0012.1] The invention provides for a protective helmet comprising a main outer shell having a generally vertical plane of symmetry. At least a first accessory is removably

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connected to the main outer shell. At least a second accessory is removably connected to the main outer shell. A connecting and locking system is included. When the first accessory is removed, the second accessory can be removably connected to the main outer shell via the connecting and locking system, and when the second accessory is removed, the second accessory can be removably connected to the main outer shell via the connecting and locking system.

[0012.2] At least one of the first and second accessories may comprise a clear visor, a tinted visor, and a support structure. At least one of the first and second accessories may comprise a support structure for an optronic device. The optronic device may comprise a night-vision device. Thus, only when the first accessory is removed can the second accessory be removably connected to the main outer shell via the connecting and locking system, and only when the second accessory is removed can the first accessory be removably connected to the main outer shell via the connecting and locking system. The connecting and locking system may comprise a first and second hooking pins arranged on sides of the main outer shell and first and second hooking and locking pieces arranged on the sides of each of the first and second accessories. The first and second hooking pins may be fixed to the main outer shell. The first and second hooking and locking pieces may be fixed to each of the first and second accessories. The first and second hooking pins may be arranged to extend outwardly on both sides of corresponding lateral walls of the main outer shell along a

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transverse axis. Each of the first and second hooking pins may be cylindrically shaped. Each of the first and second hooking pins may comprise a hooking groove adapted to cooperate with a corresponding hooking piece of each of the first and second accessories. The connecting and locking system may comprise hooking and locking pieces, each of the first and second accessories having two hooking and locking pieces. Each hooking and locking piece may comprise a metal bar. Each hooking and locking piece may comprise a lock device which is at least one of pivotally and movably mounted. The lock device may be biased by an elastic system. The elastic system may comprise a torsional spring. Each hooking and locking piece may comprise an open slot. The lock device may be connected to each hooking and locking piece via a journal. The lock device may comprise a locking projection. Each hooking and locking piece and each lock device may define an opening that is adapted to cooperate with a corresponding hooking pin. The hooking pin may be one of connected and fixed to the main outer shell. Each lock device may be pivoted downwardly against an action of a spring, and is biased upwardly by the spring. At least one of the first and second accessories may comprise a semi-spherical shaped wall made of a composite material. The semi-spherical shaped wall may have a substantially triangular shape. At least one of the first and second accessories may comprise an ocular protective screen. The ocular protective screen may be pivotally movable about a transverse axis with respect to the main outer shell between at least two positions. One of the at least two positions may be a lowered

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active position of use, whereby the ocular protective screen is arranged in front of a user's eyes, and another of the at least two positions may be a raised inactive position of use, whereby the ocular protective screen is arranged above a portion of the main outer shell. The ocular protective screen may be guided in a center of the helmet by a guiding and locking carriage. The guiding and locking carriage may be movable in a central slide. The central slide may be disposed on the main outer shell. At least one of the first and second accessories may comprise a support structure and may further comprise a protective screen. The protective helmet may further comprise a space arranged between the support structure and the protective screen. Each of the support structure and the protective screen may be movably mounted to the main outer shell. The protective screen may be arranged between the support structure and the main outer shell. The support structure may comprise at least one opening. At least one of the support structure and the protective screen may be connected to a guiding carriage. The support structure may comprise at least one opening. At least one of the first and second accessories may comprise a protective screen.

[0012.3] The invention also provides for a protective helmet comprising a main outer shell. A first support structure is adapted to be removably connected to the main outer shell. A second support structure is adapted to be removably connected to the main outer shell. A protective screen is movably mounted to the main outer shell. A connecting and locking system is provided. When the first support structure is removed, the second support structure

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can be removably connected to the main outer shell via the connecting and locking system, and when the second support structure is removed, the first support structure can be removably connected to the main outer shell via the connecting and locking system.

[0012.4] The invention also provides for a protective helmet comprising a main outer shell. A support structure is adapted to be removably connected to the main outer shell. A protective screen is adapted to be removably connected to the main outer shell. A connecting and locking system is provided. When the support structure is removed, the protective screen can be removably connected to the main outer shell via the connecting and locking system, and when the protective screen is removed, the support structure can be removably connected to the main outer shell via the connecting and locking system.

Please replace paragraphs 0013 to 0035 on pages 2-7 of the specification with the following (see Appendix 4 for changes):

[0013] Other characteristics and advantages of the invention will become apparent from the description that follows, with reference to the annexed drawings which are only provided by way of non-limiting examples.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a lateral view, with a partial tear, showing the helmet according to the invention with one of its accessories, in particular, its support for a night-vision device;

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Fig. 2 is a perspective view of the helmet without its accessory;

Fig. 3 is a perspective view of the helmet with its support for a night-vision device, the device not being shown;

Figs. 4 and 5 are views showing the supports for a night-vision device, with the system for connecting to the helmet. Fig. 4 is a rear perspective view, and Fig. 5 is a front perspective view;

Figs. 6, 7, and 8 are views showing the connecting system affixed to the accessory. Fig. 6 is an outer lateral view, Fig. 7 is an end view, and Fig. 8 is an inner lateral view;

Figs. 9, 10, and 11 are views showing the connecting bar without its lock;

Figs. 12, 13, and 14 are views showing the corresponding lock;

Figs. 15, 16, and 17 show the various steps in fixing the support;

Fig. 18 is a rear perspective view showing how the third point for connecting the support to the helmet is obtained;

Fig. 19 shows the corresponding connecting portion of the support;

Figs. 20-22 show the various steps in releasing the support;

Figs. 23 and 24 show two types of possible accessories that can be detachably connected to the helmet;

Fig. 23 shows an alternative support for a night-vision device;

Fig. 24 shows the helmet according to the invention with a detachable facial protective

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screen; and

Fig. 25 shows the helmet of the invention with a detachable ocular protective screen.

DETAILED DESCRIPTION OF THE INVENTION

[0014] The protective helmet shown in Figs. 1-24, generally designated by the reference numeral 1 is, for example, a helmet for aircraft or helicopter pilots having a generally longitudinal plane of symmetry P, which includes, in a known fashion, a main outer shell 2 having a front facial opening 2 with an internal padding commonly called the cap.

[0015] The main outer shell 2 is constituted by a substantially spherical wall, with a generally vertical plane of symmetry P, which is advantageously made of a composite material of the type including a stacking of layers of reinforcing fibers, impregnated and linked to one another by a resin matrix. The fibers can be glass, aramid, Nylon, polyethylene, or carbon fibers, whereas the matrix can be a thermosetting- or thermoplastic-type resin.

[0016] The main outer shell 2 includes a plurality of wall portions, namely, a front upper wall portion 6 extended rearwardly by a rear upper wall portion 7 itself extended downwardly by a rear lower wall portion 32, and further includes two lateral wall portions 9a and 9b. The front upper portion 6 corresponds to the zone occupied by the user's forehead and is limited by the upper edge 10 of the facial opening 3 which is limited laterally by two lateral edges 11a and 11b. The rear upper wall portion 7 corresponds to the zone occupied by the user's skull, whereas the rear lower wall portion 32 corresponds to the zone occupied by the user's

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nape of the neck. Moreover, the wall 32 of the cap is limited downwardly by a lower edge 12. The lateral wall portions 9a and 9b correspond to the zones occupied by the user's ears and are limited forwardly by the corresponding lateral edge 11a and 11b of the facial opening 3 and downwardly by the front ends of the lower edge 12. The connection between the lateral edges 11a, 11b and the lower edge 12 occurs along an advantageously curved connecting edges 13. The helmet 1 of the invention further includes a chin strap 14 constituted, for example, by a flexible strap.

[0017] Furthermore, the inner covering of the shell 2 is constituted by a cap made, for example, of a rigid foam covered with a comfort flexible foam layer and a fabric for the internal decoration of the helmet.

[0018] The helmet 1 according to the invention can include an ocular protective screen 5 pivotally movable about a transverse axis XX' in relation to the shell 2 between two positions, i.e., between a lowered active position of use according to which it is positioned in front of the user's eyes and a raised inactive position of non-use according to which it is raised so as to be in front of the frontal wall of the shell 2. The screen 5 is guided in the center of the helmet 1 by a guiding and locking carriage 50 moving in a central slide 51.

[0019] The helmet 1 according to the invention is adapted to receive an accessory such as, for example, a support structure 8 or 8' for a night-vision device 9 or a clear or tinted visor 8", for example.

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[0020] According to one characteristic of the invention, the helmet 1 includes a connecting and locking system adapted to detachably fix one or the other of the accessories, depending on the user's needs.

[0021] Thus, according to one characteristic of the invention, connecting and locking mechanisms are provided between the helmet 1 and the accessory 8, 8' or 8'', which enable the accessory to be reliably connected to the helmet 1 while allowing a particularly simple and voluntary detachment.

[0022] The support structure 8 of the night-vision device 9 is constituted by a wall made of a composite material that has substantially the shape of a triangular sphere portion.

[0023] It is noted that the wall of the support structure 8 is arranged at the level of the front upper wall portion 6 of the shell 2, beyond and at a certain distance from the latter so as to leave a space e enabling the protective screen 5 to move with its guiding carriage 50, as is particularly visible in Fig. 1. Furthermore, the support 8 includes at least one hole and advantageously two elongated holes or openings 80 and 81 enabling the user to have access to the guiding carriage 50 of the ocular protective screen 5, in order to be able to maneuver it even in the presence of the night-vision device 9.

[0024] The connecting and locking system includes hooking pins 15a and 15b affixed to the shell 2 of the helmet 1 and hooking and locking pieces 16a and 16b affixed to the accessory 8. Each of the pins 15a and 15b extends outwardly on both sides of the

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corresponding lateral walls 9a and 9b of the shell 2 and is advantageously arranged coaxially with respect to the transverse pivoting axis XX' of the ocular protective screen 5. In addition, each of the advantageously cylindrical pins 15a and 15b includes a hooking groove 150a and 150b adapted to cooperate with the corresponding hooking pieces 16a and 16b of the support 8.

[0025] Each hooking and locking piece 16a and 16b is constituted by a metallic bar 17 fixed to the support structure 8, 8' or 8'', and includes a housing 18 open rearwardly and a pivotally movable lock 19 biased by an elastic system such as a torsional spring 20.

[0026] The lock 19 is constituted by a hook-shaped metallic piece journalled on the hooking bar 17 about a pivoting axle 21. Each lock 19 therefore includes a rear locking projection 22 extending upwardly to form, together with the housing 18 of the bar 17, a hole 23 adapted to cooperate with the corresponding hooking pins 15a and 15b of the shell 2.

[0027] It is noted that the housing 18 of the bar 17 is limited upwardly and downwardly by an upper edge 24 and a lower edge 25, the end of the upper edge 24 including a first chamfer 26. Furthermore, the rear edge 27 of the locking projection 22 includes a second chamfer 28 adapted to form, together with the first chamfer 26 of the bar, a V-shaped opening 30 for engaging the hooking pins 15a and 15b of the helmet 1, promoting the snap positioning of the support 8 or 8'. The lock 19 is pivotally arranged on its corresponding bar 17 so as to be capable of pivoting downwardly along direction R against the action of the

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spring 20, and to be biased in upward abutment by this spring 20.

[0028] The support 8 of the night-vision device 9 is such that its triangular wall carries a hooking piece 16a, 16b at each of its lateral ends 29a and 29b, whereas its central upper end 29 includes a hooking mechanism 30 adapted to cooperate with a central upper hooking piece 31 fixed to the wall of the shell 2 of the helmet 1. Thus, the support 8 of the night-vision device 9 is fixed to the helmet 1 at three points, i.e., at points A, B and C, thus forming a perfect retention triangle.

[0029] Figs. 15, 16 and 17 illustrate the procedure for fixing the support 8. The procedure begins by bringing the wall support 8 closer to the helmet 1 (see Fig. 15), then by hooking the hooking mechanism 30 of the upper central end 29 on the upper central hooking piece 31 as shown in Fig. 16, and then by snap engaging the hooking pieces 16a and 16b on the corresponding pins 15a and 15b (see Fig. 17).

[0030] The separation of the support 8 from the helmet 1 is carried out just as easily, as illustrated in Figs. 20, 21, 22. To unlock, the user only has to press forwardly, along F, on each of the movable locks 19 with his two thumbs engaging rear edges 27, as shown in Fig. 20. This causes the downward pivoting of each of the locks 19, on the one hand, and the forward pivoting of the support 8, and results, therefore, in its disengagement from the pins 15a and 15b.

[0031] Of course, the device carried by the support 8 can be of any type other than a

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device which supports the night-vision device 9, such as an assembly of optronic devices, binoculars, or the like, for example.

[0032] It is noted that the support 8 previously described and illustrated in Figs. 1-22 is constituted by a substantially rectangular spherical wall 8, but it could be otherwise, as shown in Fig. 23, for example. According to this alternative, the support 8 is constituted by a frontal band 8'.

[0033] In addition, the detachable accessory can also be a clear or tinted transparent facial protective screen 8" as shown in Fig. 24, without leaving the scope of the invention, the screen 8" being detachable and pivotal about each of the pins 15a and 15b so as to be movable between two positions, namely, an inactive raised position designated by I and a lowered position of use designated by II. The detachable facial screen 8" is therefore connected laterally to the hooking pins 15a and 15b and in its upper central portion 29 to the guiding carriage 50; of course, the connection to the carriage 50 is also detachable and can be, for example, as that described previously in connection with the embodiments shown in Figs. 15-19.

[0034] The accessory can also be a detachable ocular screen 5', as shown in Fig. 25, the connection to the helmet 1 being identical to that of the facial screen described with regard to Fig. 24.

[0035] It is understood that due to the connection interface devices 15a, 15b, 16a and 16b,

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it is possible for the user to detachably fix an accessory and to remove it in order to fix another to the helmet 1.

Please replace the Abstract with the Abstract of the Disclosure appended on the next page.